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Authors
Lee, Eunice
Natipagon-Shah, Bulaporn
Sangsanoi-Terkchareon, Samantha
et al.

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ORIGINAL PAPER

Factors Influencing Colorectal Cancer Screening Among Thais in the U.S.

Eunice Lee[1] · Bulaporn Natipagon-Shah[2] · Samantha Sangsanoi-Terkchareon[3] · Umme Shefa Warda[1] · Shin-Young Lee[4]

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Abstract

This study examined factors related to colorectal cancer (CRC) screening uptake among Thais in the United States. A total of 121 Thais between 50 and 75 years of age, who were married and living in southern California participated in the survey (mean age = 61 years). Out of all the participants, only 21% of the participants had fecal occult blood tests, 21% had sigmoidoscopy, and 45% had colonoscopy that were within the recommended period. Overall, 55% of participants met CRC screening adherence criteria. Participants who had had regular checkups in the previous 2 years without having any symptoms were 16 times more likely to have obtained CRC screening than their counterparts (OR 16.01, CI 3.75–68.75) in the multivariable logistic regression model. Other significant predictors of screening adherence included older age (OR 1.08, 95% CI 1.00–1.17), having lived in the U.S. 15 years or longer (OR 6.65, 95% CI 1.55–28.59), having had at least some college education (OR 3.74, 95% CI 1.23–11.37), and higher levels of perceived self-efficacy (OR 1.88, 95% CI 1.01–3.50) to obtain CRC screening. Targeted interventions for Thais who are less likely receive CRC screening could be effective in improving CRC screening. Interventions to improve the populations' awareness of the importance of preventive measures when they are not sick could be also effective.

Keywords Colorectal cancer · Cancer screening · Thai Americans · Health beliefs · Spousal support

Introduction

Among all malignancies, colorectal cancer (CRC) is the third most common cancer in both U.S. men and women [1]. CRC has been one of the leading causes of death among U.S. minorities and disparities have been noted in cancer incidence, mortality, and survival rates among Asian populations in the United States [1]. Asians are one of the fast-growing groups among the U.S. immigrants, [2]. The Thai population in the United States has increased by 58.1% in the past decade, and 237,583 Thais lived in United States at the time of the 2010 census [2]. No data are available regarding CRC incidence and mortality rates in the United Stated Thai population. However, we believe CRC should be one of their health concerns, considering the growth of the number of Thais in the United States and that CRC incidence rates in South Asians, Filipinos, and Koreans increased significantly between 1988 and 2007 based on California Cancer Registry data [3, 4].

Screening decreases both the incidence and mortality of CRC by detecting a higher proportion of cancers at earlier

✉ Shin-Young Lee
shinyoung0114@gmail.com

Eunice Lee
eclee@sonnet.ucla.edu

Bulaporn Natipagon-Shah
bnatipagonsh@csusm.edu

Samantha Sangsanoi-Terkchareon
Ssangsanoi@sdccd.edu

Umme Shefa Warda
uwarda@sonnet.ucla.edu

1 School of Nursing, University of California, Los Angeles, 700 Tiverton Ave., #-4-258, Los Angeles, CA 90095, USA

2 School of Nursing, California State University, San Marcos, 333 S. Twin Oaks Valley Rd., San Marcos, CA 92096, USA

3 Department of Nursing, San Diego City College, 1313 Park Boulevard, San Diego, CA 92102, USA

4 Department of Nursing, Chosun University, 309 Pilmun-daero, Dong-gu, Gwangju 501-759, Republic of Korea

and more treatable stages [5–9]. The United States Preventive Services Task Force (USPSTF) recommends regular CRC screening of both men and women 50–75 years of age via one of the following methods: (1) annual high-sensitivity Fecal Occult Blood Test (FOBT), (2) sigmoidoscopy every 5 years combined with high-sensitivity FOBT every 3 years, or (3) colonoscopy every 10 years [10]. Although data show a significant benefit to screening, statistics from the 2016 National Health Interview Survey showed that only 52.1% of at-risk, eligible Asians had had CRC screening, compared to 65.6% of white and 60.3% of black Americans [11, 12]. Low CRC cancer screening rates have also been widely observed among immigrants [13–15].

A recent systemic review of factors associated with CRC screening revealed that ethnic minorities, new immigrants, single people, and those who have low incomes, little education, and lack English proficiency most frequently reported barriers to receiving CRC screening [16]. Immigrants may have different values and beliefs about screening services or lack acculturation to U.S. social norms for cancer screening. While several studies examining cancer screening behaviors attempted to target Asian ethnic groups in the United States, Asian immigrants were usually grouped based on their geographical backgrounds, with the Thai immigrant population often categorized as "other Asian subgroups" because of the relatively small number of Thais in the United States. Therefore, most common cancer screenings such as colorectal, cervical, and breast cancer are not well studied among them. To the best of our knowledge, only a few studies focusing on breast and cervical cancer screening in Thai immigrant women were published in the past decade. According to those studies, breast and cervical cancer screening rates among Thai immigrant women in the US were much lower than national screening rates [17, 18]. A study of Thai immigrant women in Southern California [19] found that participants perceived breast cancer as a consequence of an individual's collective deeds in earlier years, and that the chances of developing breast cancer could not be altered. We speculate that CRC screening rates are similarly low among Thai immigrants, but no report regarding their CRC screening rates or their beliefs about screening is available in the literature.

This study was guided by the health belief model (HBM) [20, 21]. The HBM asserts when people perceive themselves as susceptible to a condition (perceived susceptibility), perceive action would be beneficial to reduce either their susceptibility or the severity of the condition (perceived benefits), perceive that the tangible and psychological costs (perceived barriers) are outweighed by the benefits, and feel confident that they can carry out the action (self-efficacy), they will take action to prevent the condition [21]. Because family support is known to influence cancer screening among African Americans and Koreans [22–24], social support theory [25] was also included in our framework. We hypothesized people would receive any form of CRC screening (FOBT, sigmoidoscopy, colonoscopy) if they have accurate perceptions about CRC screening and support from spouses. The purpose of this study, therefore, was to describe the influence of sociodemographics, health characteristics, health beliefs, and spousal support on CRC screening practices, CRC screening utilization rates, and predictors for CRC screening utilization among Thai immigrants in the United States.

Methods

Study Design and Sample

A descriptive correlational design was used. A community sample of 121 Thai immigrants living in Southern California participated in this study. Inclusion criteria for the sample were self-identification as Thai born in Thailand, age 50–75 years, and being married. We included only married Thais in this study to examine the influence of spousal support on CRC screening uptake among the population.

Data Collection

After obtaining an approval from the South General Institutional Review Board which reviews social–behavioral research at the University of California, Los Angeles, fliers in Thai were posted in reception areas of a Thai community service agency and two Thai temples. Thais who were interested in participating in the study were asked to contact the second or third authors of this study or to come to a designated area in the community service agency or temple to learn more about the study. All the participants who showed interest in participating in the study were screened using the screening script approved by the university. Once prospective participants were determined to be eligible, written informed consent was obtained from all participants. Written consent forms that explained the purposes, procedures, risks, and confidentiality involved in the study were provided to participants. Participants were informed that they could withdraw from the study at any time. It took about 20 min to respond to a paper-and-pencil survey. Each participant received a $10 gift card after completing the study.

Measures

The primary outcome for the study was CRC screening adherence, which was defined as having an FOBT in the past 12 months, a sigmoidoscopy within the past 5 years, or receiving a colonoscopy within the past 10 years. Sociodemographic variables included age, education, and

employment status. Number of years in United States and level of English proficiency (not at all, a little, average, and fluent) were asked to estimate the level of acculturation. Participants were also asked to assess their health status. Data were collected related to health care characteristics, such as having health insurance, usual source of care (having a regular place or doctor to visit, having a physical examination without sickness or for health problems in the previous 2 years), and personal and family histories of cancer.

Perceived susceptibility to developing CRC and perceived benefits, barriers, and self-efficacy for obtaining CRC screening were measured using HBM subscales [26, 27]. All of the subscales use Likert-scale responses ranging from *strongly disagree* = 1 to *strongly agree* = 5. Higher scores indicate greater perceived levels or beliefs. The Cronbach's alpha for measuring susceptibility (three items), benefits (three items), barriers (seven items), and self-efficacy (eight items) in this study were 0.91, 0.88, 0.93, and 0.87, respectively. In measuring spousal support, we asked whether respondents' spouses encouraged or advised them to have the CRC screening; this question used 'yes' and 'no' option response. All the instruments were translated from English to Thai by the second author and back translated by a nurse who is fluent in Thai and English. The translated instrument was then verified by the third author. All the study participants responded to the Thai version of the survey.

Data Analysis

The recruited sample size was estimated as sufficient to detect a small (odds ratio equivalent to d = 0.29) effect for odds ratios from preliminary bivariate logistic regression models, with two-tailed alpha = 0.05 and power = 0.80, for an expected 50% adherence rate (using G power software), [28]. For multivariate logistic regression, a small-to-medium (approximately equivalent to d = 0.41) effect size for an individual predictor in the multivariate model would be detectable assuming up to 30% of variance accounted for by other predictors and no more than 15% of cases with missing data on one or more predictors.

All statistical analyses were performed using SAS Version 9.4. Initial analyses included all the key variables in the study. Then relationships of sociodemographic, acculturation, health and other variables to CRC screening adherence were examined in two ways using logistic regression: first, in simple bivariate analyses to find whether potential predictors were related to CRC screening adherence individually; and second, in multivariate analyses with all potential predictors. Results from the simple bivariate analyses were used to inform the multivariate model; all variables with a p-value < 0.50 in the simple bivariate analyses were entered in the multivariate logistic regression model to maximize parsimony. The multivariate model used a backward selection approach to avoid redundancy and further maximize parsimony, thus omitting variables not adding significant additional information to the model.

Results

Sociodemographic, Health Beliefs and Spousal Support

Table 1 summarizes the sociodemographic data for study participants. A total of 121 Thais aged between 50 and 75 years participated in the study. All participants were immigrants and the majority (88%) had lived in the United States for more than 15 years. Fewer than half of them were working (47.1%). Even though almost half of the participants (48%) had a college education, 65% of them didn't speak English at all or spoke only a little English.

More than half of the participants rated their health as excellent or very good (55%). The overwhelming majority of participants had health insurance (93%), a primary physician (90%), and had received a checkup without symptoms within the previous 2 years (82%) (Table 1).

Among the four health belief subscales, participants reported the highest score on the perceived benefits scale (M = 4.0, SD = 0.86) compared to perceived susceptibility, barriers, and self-efficacy. Less than half of the participants (34%) reported receiving spousal encouragement in obtaining the CRC test.

CRC Screening Rates

A little more than half of the participants had had a Fecal Occult Blood Test (FOBT) (55%) in their lifetime, only 21% of the participants had the test in the prior year. The screening rate for sigmoidoscopy was much lower, with 27% of participants having ever had one and 21% of the participants having one within the previous 5 years. The rate for ever having had a colonoscopy was 53%, with 45% of participants having had the test within the previous 10 years. A total of 86 respondents (71%) had ever had at least one of the screening tests, and 66 respondents (55%) were up to date on overall CRC screening adherence (Table 2).

Predictors of CRC Screening Adherence

Table 3 shows results of simple (bivariate) logistic regression analysis of CRC adherence by each potential predictor with a p-value of < 0.5. To be conservative in our variable selection, this p-value cut-off point of 0.5 was used for inclusion in the initial multiple logistic regression model. Eleven variables from the bivariate logistic analysis shown in Table 3 as possible predictors were entered in the multiple

Table 1 Sociodemographic and other characteristics of participants (N = 121)

Participants characteristics	Mean (SD)	N (%)
Age	61.27 (6.66)	
Years lived in US[a]		
Less than 15		15 (12.5)
More than 15		105 (87.5)
Fluent in english		
No/little		78 (64.5)
Average/fluent		43 (35.5)
Health insurance		
No		8 (6.6)
Yes		113 (93.4)
Educational completed		
High school grad or less		66 (51.7)
College/undergraduate/graduate		58 (48.3)
Work status		
Working		57 (47.1)
Not working		64 (52.9)
Health status[a]		
Excellent/very good		66 (55.0)
Fair/poor		54 (45.0)
Non-emergency medical care[a]		
Private doctor's office		28 (23.1)
Community clinic/health center		62 (51.2)
Hospital/other		31 (25.6)
Have primary physician		
No		12 (9.9)
Yes		109 (90.1)
Checkup within last 2 years[a,**]		
No		22 (18.3)
Yes		98 (81.7)
Diagnosed with cancer[a]		
No		109 (90.8)
Yes		11 (9.2)
Family member had cancer		
No		97 (80.2)
Yes		24 (19.8)
Spousal encouragement[a]		
No		79 (65.8)
Yes		41 (34.2)
Health beliefs		
Susceptibility[**,b]	3.7 (0.85)	
Benefit	4.0 (0.86)	
Barriers[*,c]	3.9 (0.85)	
Self-efficacy[d]	3.4 (0.82)	

*p < .05

**p < .01

[a]N = 120

[b]N = 113

[c]N = 117

[d]N = 118

Table 2 Colorectal cancer screening rates for non-US born Thais aged 50–75 years (N = 121)

Colorectal cancer screening type	N (%)
FOBT ever	
No	55 (45.5)
Yes	66 (54.5)
FOBT in past year	
No	95 (78.5)
Yes	26 (21.5)
Sigmoidoscopy ever[a]	
No	88 (73.3)
Yes	32 (26.7)
Sigmoidoscopy adherence	
No	95 (78.5)
Yes	26 (21.5)
Colonoscopy ever	
No	57 (47.1)
Yes	64 (52.9)
Colonoscopy adherence	
No	67 (55.4)
Yes	54 (44.6)
Ever had one of the CRC tests	
No	35 (28.9)
Yes	86 (71.1)
CRC screening adherence[b]	
No	55 (45.4)
Yes	66 (54.6)

[a]N = 120

[b]Adherence to guidelines was defined as having an FOBT in the past 12 months, a sigmoidoscopy within the past 5 years, or receiving a colonoscopy within the last 10 years

logistic regression model. Using backward stepwise selection method to reduce redundancy, controlling for all other variables, older age, living more than 15 years in the United States, having some college education, having higher levels of perceived self-efficacy, and receiving regular checkups without symptoms significantly predicted adherence to CRC screening (Table 4). The odds of CRC screening adherence was 8% higher for every additional year of age (OR 1.08, 95% CI 1.00–1.17). Participants who have lived more than 15 years in the United States had odds of CRC screening adherence 6.7 times greater than respondents who lived here fewer than 15 years (OR 6.65, 95% CI 1.55–28.59). Those with at least some college (OR 3.74, 95% CI 1.23–11.37) and higher self-efficacy scores (OR 1.88, 95% CI 1.01–3.50) also had significantly higher odds of CRC screening adherence. Most importantly, the odds of CRC screening adherence were 16 times greater for respondents who had gone for regular checkups without symptoms in the previous two years than their counterparts who did not have regular checkups (OR 16.01, 95% CI 3.75–68.75).

Table 3 Predictors of colorectal cancer screening adherence from simple (bivariate) logistic regression

	Coefficient	SE	p value	Odds ratio	95% CI
Age	0.08	0.03	0.005*	1.09	1.02–1.15
Lived more than 15 years in US (yes)[a]	1.02	0.58	0.08	2.77	0.89–8.68
English speaking capability (fluent/average)[b]	0.52	0.39	0.18	1.69	0.79–3.61
Education level (Some college)[c]	0.48	0.37	0.19	1.62	0.79–3.35
Family member diagnosed with cancer (yes)[a]	0.41	0.47	0.38	1.50	0.60–3.76
Checkup within last 2 years (yes)[a]	2.43	0.66	< 0.001*	11.40	3.15–41.24
Spousal encouragement (yes)[a]	0.89	0.40	0.03*	2.44	1.11–5.40
Susceptibility	0.47	0.23	0.04*	1.61	1.02–2.54
Benefit	0.54	0.23	0.02*	1.72	1.09–2.70
Barriers	0.22	0.22	0.31	1.25	0.81–1.93
Self-efficacy	0.35	0.23	0.13	1.42	0.90–2.23

*Age, Checkup within last 2 years, Spousal encouragement, Susceptibility scale, Benefit scale each significantly predict CRC screening

[a]Compared to 'no'

[b]Compared to 'not at all/a little'

[c]Compared to 'high school graduate or less'

Table 4 Predictors of colorectal cancer screening adherence from multivariate logistic regression (N = 107)

	Coefficient	SE	p-value	Odds ratio	95% CI
Age	0.08	0.04	0.045*	1.08	1.00–1.17
Lived more than 15 years in US (yes)[a]	1.89	0.74	0.011*	6.65	1.55–28.59
Education (some college or higher)[b]	1.32	0.57	0.020*	3.74	1.23–11.37
Checkup within last 2 years (yes)[a]	2.77	0.74	< 0.001*	16.01	3.75–68.75
Self-efficacy	0.63	0.32	0.046*	1.88	1.01–3.50

Global Chi square likelihood ratio test = 40.76, df = 7, p-value = 0.0001

*Significant predictor of CRC screening with p-value < 0.05

[a]Compared to 'no'

[b]Compared to high school graduate or less

Discussion

This is the first study to examine CRC screening rates and the influence of health beliefs, and spousal support on CRC screening utilization among Thais in the United States. In general, there is little information on cancer screening utilization, including CRC screening, among Thais in the United States. Our work shed light on CRC screening behaviors and the influence of health beliefs and spousal support on screening behaviors in the population. Most importantly, we found that study participants who had regular checkups without symptoms in the previous 2 years were more than 16 times more likely to be adherent to CRC screening than their counterparts. The literature consistently reports that having routine checkups without symptoms is related to CRC screening adherence among Asians, including Chinese, Korean, and Vietnamese [29–32].

In our study, although spousal support and perceived benefits were significant predictors of CRC at the bivariate level, at the multivariate level, when the effects of all the other predictors were taken into account, the effect of these two were no longer significant. Therefore, the exact mechanism of how perceived benefits, spousal support, and regular checkups might have influenced CRC screening behaviors needs to be examined. Other variables that we did not measure, such as receiving recommendations from physicians for CRC screening, insurance coverage for CRC screening, or beliefs about preventive orientation, could also have played a role in the pathway. More in-depth understanding will enable researchers to design more effective and efficient CRC screening programs in the future.

Other significant predictors of CRC screening adherence in the multivariate logistic regression model included older age, having lived in the United States for 15 years or longer, having had at least some college education, and a higher level of perceived self-efficacy to obtain CRC screening. Age, education, and the length of stay in the US have been reported consistently as predictors for CRC screening among

Asian Americans [29, 33]. Immigrant women who stayed in the United States for > 5 years were less likely to receive CRC than native citizens, according to the 2000–2010 National Health Interview Survey [34]. A literature review also found that Asian Americans who recently arrived in the US were vulnerable to CRC because of their lack of CRC screening utilization [29].

Among those variables based on the HBM, CRC screening self-efficacy, perceived ability to obtain CRC screening, was the only predictor for receiving CRC screening, even though perceived susceptibility to developing CRC and benefits of receiving CRC screening were in the simple logistic regression model. Perceived self-efficacy has been consistently significantly positively related with CRC screening utilization behaviors across studies [35–37]. Self-efficacy is known to be effective in promoting health behavior change [38], which suggests that educating Thais to improve their self-efficacy could be effective in improving their CRC screening uptakes.

Surprisingly, other concepts in the HBM did not predict the study participants' CRC screening utilization behaviors. In a literature review on individual-level health behavior constructs and CRC screening behaviors, the majority of studies of HBM supported the hypotheses that perceived benefits, barriers, and susceptibility are related to the screening behaviors [37, 39]. Our sample of a homogenous group who reported relatively high mean scores (3.7–4.0 on the 5-point Likert scale), except 3.4 on the self-efficacy scale, and low variances (SD = .82–.85) on the HBM constructs could have caused the insignificant relationships between the HBM constructs (except self-efficacy) and CRC screening behaviors.

Studies have examined the influence of spousal support on cancer survivors, but fewer studies have examined spousal support for cancer screening, especially CRC screening. Studies on breast, cervical, and prostate cancer screening demonstrated the importance of support provided by spouses for their partners' screening behaviors among people in various ethnic groups [22, 40] as well as women who had little education and were in low socioeconomic groups in the United States [41] and other countries [42–45]. Most of literature related to social support and CRC screening examined social support in African Americans [23, 46]. When African Americans and whites were compared, those who were socially connected were more than three times more likely to have had recent CRC screening than those who were not, but the association was stronger among blacks (OR 3.8) than whites (OR 2.9) [46]. Having the structural social support (having strong social connections) appeared to be more important for CRC screening than emotional or instrumental support. Further examination of various aspects of social support related to CRC screening in the population is warranted.

The findings that 71% of participants had ever had one of the CRC screening tests and 55% of participants' screenings were up-to-date in our study are similar to overall United States. CRC screening rates. In the 2010 National Health Interview Survey, 58.6% of adults had up-to-date CRC screening [47]. The CRC screening adherence rate in Thai Americans in our study is higher than reported CRC screening rates of 46.8% among Asian Americans based on the 2001, 2003, and 2005 California Health Interview Survey (CHIS) data [48] and 13% of community-based Asian American data representing Cambodian, Korean, Vietnamese, and Chinese Americans in the greater Philadelphia area, New Jersey, and New York City [33]. Even though Thais in our sample have higher CRC screening rates than other Asians, it is still below the Healthy People 2020 target of 70.5% for adults aged 50–75 years [49].

Clinical/Public Health Implications

It would be most urgent to encourage Thais in the United States to receive routine checkups although they are asymptomatic. Community-based campaigns for the importance of receiving CRC screening could be effective, especially when the campaign is culturally and linguistically sensitive. Collaborating with community agencies, religious organizations, newspapers and radio stations, or clinics could be cost-effective in reaching larger populations. When Thais visit clinics for symptoms, educating them to return to the clinic for routine checkups could also be an effective strategy.

Limitations

There are limitations in sampling, outcome measurement, and design. First, our sample is from Thais living in Southern California. Most of the participants were immigrants who had lived in the United States for more than 15 years. Without national data, it is hard to determine if our data are generalizable to Thais nationwide. Second, the CRC screening outcomes were measured by responses to the self-reported question, and there could be recall bias or response bias on the self-reported outcomes. Third, the validity of the translated instruments has not been established. Lastly, we used a cross-sectional design, so findings from this study cannot be used to explain causal relationships.

Conclusion

This study is one of the first to examine the influence of health beliefs and spousal support on CRC screening among Thai Americans. Having a routine physical examination without symptoms was the strongest predictor for receiving CRC screening among Thais in our study. After

finding Thais who obtained routine screenings even when they did not have any symptoms are more likely to receive CRC screening, the logical next step would be to explore how to increase routine physicals for asymptomatic Thais to improve screening adherence. Preventive health education might be efficient to advance CRC screening and other health-related behaviors in this population.

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Compliance with Ethical Standards

Conflict of interest All authors of this article declare they have no financial support or conflicts of interest to report.

Ethical Approval This study was conducted in accordance with the Declaration of Helsinki. TheInstitutional Review Board of a university in southern California approved this study.

References

1. American Cancer Society. (2017). Cancer Facts and Figs. 2017. Retrieved from https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2017/cancer-facts-and-figures-2017.pdf.
2. Hoeffel, E. M., Rastogi, S., Kim, M. O., & Shahid, H. (2012). The Asian population 2010. Retrieved from https://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf.
3. Miller, B. A., Kolonel, L. N., Bernstein, L., Young, J. L., Swanson, G. M., West, D. W., Key, C. R., Liff, J. M., Glover, C. S., & Alexander, G. A. (Eds.), (1996). *Racial/ethnic patterns of cancer in the United States 1988–1992*. Bethesda: National Cancer Institute.
4. Giddings, B. H., Kwong, S. L., Parikh-Patel, A., Bates, J. H., & Snipes, K. P. (2012). Going against the tide: Increasing incidence of colorectal cancer among Koreans, Filipinos, and South Asians in California, 1988–2007. *Cancer Causes & Control, 23*, 691–702.
5. Smith, R. A., von Eschenbach, A. C., Wender, R., Levin, B., Byers, T., Rothenberger, D., et al. (2001). American Cancer Society guidelines for the early detection of cancer: Update of early detection guidelines for prostate, colorectal, and endometrial cancers. Also: Update 2001–testing for early lung cancer detection. *CA: A Cancer Journal for Clinicians, 51*(1), 38–75, **(quiz 77–80)**.
6. Pignone, M., & Levin, B. (2002). Recent developments in colorectal cancer screening and prevention. *American Family Physician, 66*(2), 297–302.
7. National Cancer Institute. (2010). Sigmoidoscopy markedly reduceds colorectal cancer incidence and mortality. Retrieved from http://www.cancer.gov/clinicaltrials/results/sigmoidoscopy0510.
8. Atkin, W. S., Edwards, R., Kralj-Hans, I., Wooldrage, K., Hart, A. R., Northover, J. M., et al. (2010). Once-only flexible sigmoidoscopy screening in prevention of colorectal cancer: A multicentre randomised controlled trial. *Lancet, 275*(9726), 1624–1633.
9. Levin, B., Lieberman, D. A., McFarland, B., Smith, R. A., Brooks, D., Andrews, K. S., et al. (2008). Screening and surveillance for the early detection of colorectal cancer and adenomatous polyps, 2008: A joint guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. *CA: A Cancer Journal for Clinicians, 58*(3), 130–160.
10. U. S. Preventive Services Task Force (2011). Recommendations for adults: Cancer. Retrieved from http://www.uspreventiveservicestaskforce.org/adultrec.htm.
11. Center of Disease Control and Prevention. (2017). Mammography use and colorectal cancer testing use, by race and Hispanic origin: United States, selected years 1987–2015—colorectal cancer testing use. Retrieved from https://www.cdc.gov/nchs/data/hus/2016/fig19.pdf.
12. American Cancer Society. (2017). American cancer society recommendation for colorectal cancer early detection. Retrieved from https://www.cancer.org/cancer/colon-rectal-cancer/detection-diagnosis-staging/acs-recommendations.html.
13. Kiran, T., Glazier, R., Moineddin, R., Gu S., Wilton, A. S., Paszat, L. (2017). The impact of a population-based screening program on income- and immigration-related disparities in colorectal cancer screening. *Cancer Epidemiology, Biomarkers & Prevention, 26*(9), 1401–1410. https://doi.org/10.1158/1055-9965.EPI-17-0301.
14. Jerant, A. F., Fenton, J. J., & Franks, P. (2008). Determinants of racial/ethnic colorectal cancer screening disparities. *Archives of Internal Medicine, 168*(12), 1317–1324.
15. Goel, M. S., Wee, C. C., McCarthy, E. P., Davis, R. B., Ngo-Metzger, Q., & Phillips, R. S. (2003). Racial and ethnic disparities in cancer screening: The importance of foreign birth as a barrier to care. *Journal of General Internal Medicine, 18*(12), 1028–1035.
16. Wools, A., Dapper, E. A., & de Leeuw, J. R. (2016). Colorectal cancer screening participation: A systematic review. *European Journal of Public Health, 26*(1), 158–168. https://doi.org/10.1093/eurpub/ckv148.
17. Natipagon-Shah, B. C. (2011). Factors influencing mammography screening participation among Thai Women in Southern California. In R. R. A. Palmetti (Ed.), *Mammography: Screening, Results and Risks* (pp. 1–43). Hauppauge: Nova Science Pub Inc.
18. Tsui, J., & Tanjasiri, S. P. (2008). Cervical cancer screening among Thai women in Northern California. *Journal of Women's Health, 17*(3), 393–401. https://doi.org/10.1089/jwh.2007.0427.
19. Clark, M. J., & Natipagon-Shah, B. (2008). Thai American women's perceptions regarding mammography participation. *Public Health Nursing, 25*(3), 212–220. https://doi.org/10.1111/j.1525-1446.2008.00698.x.
20. Becker, M. H. (1974). The health belief model and sick role behavior. *Health Education & Behavior, 2*(4), 409–419. https://doi.org/10.1177/109019817400200407.
21. Janz, N. K., Champion, V. L., & Strecher, V. J. (2002). The health belief model. In K. Glanz, B. Rimer & M. F. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* (3rd edn., pp. 45–66). San Francisco: Jossey-Bass.
22. Lee, E., Menon, U., Nandy, K., Szalacha, L., Kviz, F., Cho, Y., et al. (2014). The KIM-CHI program: The effect of a couples intervention to increase breast cancer screening among Korean Americans. *Oncology Nursing Forum. 41*(3), E185.
23. Brittain, K., & Murphy, V. P. (2015). Sociocultural and health correlates related to colorectal cancer screening adherence among urban African Americans. *Cancer Nursing, 38*(2), 118–124. https://doi.org/10.1097/ncc.0000000000000157.
24. Park, S., Chang, S., & Chung, C. (2005). Effects of a cognition-emotion focused program to increase public participation in Papanicolaou smear screening. *Public Health Nursing, 22*(4), 289–298.
25. Heaney, C., & Israel, B. (2008). Social networks and social support. In K. Glanz, B. K. Rimer & M. Lewis (Eds.), *Health*

behavior and health education (4th edn., pp. 185–209). San Francisco: Jossey-Bass.
26. Menon, U., Belue, R., Sugg Skinner, C., Rothwell, B. E., & Champion, V. (2007). Perceptions of colon cancer screening by stage of screening test adoption. *Cancer Nursing, 30*(3), 178–185. https://doi.org/10.1097/01.ncc.0000270706.80037.05.
27. Menon, U., Champion, V. L., Larkin, G. N., Zollinger, T. W., Gerde, P. M., & Vernon, S. W. (2003). Beliefs associated with fecal occult blood test and colonoscopy use at a worksite colon cancer screening program. *Journal of Occupational and Environmental Medicine, 45*(8), 891–898. https://doi.org/10.1097/01.jom.0000083038.56116.30.
28. Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191.
29. Hwang, H. (2013). Colorectal cancer screening among Asian Americans. *Asian Pacific Journal of Cancer Prevention, 14*(7), 4025–4032.
30. Juon, H. S., Han, W., Shin, H., Kim, K. B., & Kim, M. T. (2003). Predictors of older Korean Americans' participation in colorectal cancer screening. *Journal of Cancer Education, 18*(1), 37–42. https://doi.org/10.1207/s15430154jce1803s_3.
31. Walsh, J. M., Kaplan, C. P., Nguyen, B., Gildengorin, G., McPhee, S. J., & Perez-Stable, E. J. (2004). Barriers to colorectal cancer screening in Latino and Vietnamese Americans. Compared with non-Latino white Americans. *Journal of General Internal Medicine, 19*(2), 156–166.
32. Wong, S. T., Gildengorin, G., Nguyen, T., & Mock, J. (2005). Disparities in colorectal cancer screening rates among Asian Americans and non-Latino whites. *Cancer, 104*(12 Suppl), 2940–2947. https://doi.org/10.1002/cncr.21521.
33. Ma, G. X., Wang, M. Q., Toubbeh, J., Tan, Y., Shive, S., & Wu, D. (2012). Factors associated with colorectal cancer screening among Cambodians, Vietnamese, Koreans and Chinese Living in the United States. *North American Journal of Medical Sciences, 5*(1), 1–8.
34. Miranda, P. Y., Yao, N., Snipes, S. A., BeLue, R., Lengerich, E., & Hillemeier, M. M. (2017). Citizenship, length of stay, and screening for breast, cervical, and colorectal cancer in women, 2000–2010. *Cancer Causes & Control, 28*(6), 589–598. https://doi.org/10.1007/s10552-017-0887-x.
35. Sohlera, N. L., Jerant, A., & Franks, P. (2015). Socio-psychological factors in the expanded health belief model and subsequent colorectal cancer screening. *Patient Education and Counseling, 98*(7), 901–907.
36. Christou, A., & Thompson, S. C. (2012). Colorectal cancer screening knowledge, attitudes and behavioural intention among Indigenous Western Australians. *BMC Public Health, 18*(12), 528. https://doi.org/10.1186/1471-2458-12-528.
37. Ghobadi, D. K., Noroozi, A., & Tahmasebi, R. (2016). Factors predicting fecal occult blood testing among residents of Bushehr, Iran, based on the health belief model. *Asian Pacific Journal of Cancer Prevention, 17*(S3), 17–22.
38. Sheeran, P., Maki, A., Montanaro, E., Avishai-Yitshak, A., Bryan, A., Klein, W. M., et al. (2016). The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: A meta-analysis. *Health Psychology, 35*(11), 1178–1188.
39. Kiviniemi, M. T., Bennett, A., Zaiter, M., & Marshal, J. R. (2011). Individual-level factors in colorectal cancer screening: A review of the literature on the relation of individual-level health behavior constructs and screening behavior. *Psycho-Oncology, 20*(10), 1023–1033. https://doi.org/10.1002/pon.1865.
40. Blocker, D. E., Romocki, L. S., Thomas, K. B., Jones, B. L., Jackson, E. J., Reid, L., & Campbell, M. K. (2006). Knowledge, beliefs and barriers associated with prostate cancer prevention and screening behaviors among African-American men. *Journal of the National Medical Association, 98*(8), 1286–1295.
41. Documet, P., Bear, T. M., Flatt, J. D., Macia, L., Trauth, J., & Ricci, E. M. (2015). The association of social support and education with breast and cervical cancer screening. *Health Education & Behavior, 42*(1), 55–64. https://doi.org/10.1177/1090198114557124.
42. Gamarra, C. J., Paz, E. P., & Griep, R. H. (2009). Social support and cervical and breast cancer screening in Argentinean women from a rural population. *Public Health Nursing, 26*(3), 269–276. https://doi.org/10.1111/j.1525-1446.2009.00779.x.
43. Williams, M. S., & Amoateng, P. (2012). Knowledge and beliefs about cervical cancer screening among men in Kumasi, Ghana. *Ghana Medical Journal, 46*(3), 147–151.
44. Jensen, L. F., Pedersen, A. F., Andersen, B., & Vedsted, P. (2016). Social support and non-participation in breast cancer screening: A Danish cohort study. *Journal of Public Health, 38*(2), 335–342. https://doi.org/10.1093/pubmed/fdv051.
45. e Silva, I. T., Griep, R. H., & Rotenberg, L. (2009). Social support and cervical and breast cancer screening practices among nurses. *Revista Latino-Americana de Enfermagem, 17*(4), 514–521.
46. Kinney, A. Y., Bloor, L. E., Martin, C., & Sandler, R. S. (2005). Social ties and colorectal cancer screening among Blacks and Whites in North Carolina. *Cancer Epidemiol, Biomarkers & Prevention, 14*(1), 182–189.
47. Centers for Disease Control and Prevention. (2012). Cancer screening—United States, 2010. *Morbidity and Mortality Weekly Report, 61*(3), 41–45.
48. Lee, H. Y., Lundquist, M., Ju, E., Luo, X., & Townsend, A. (2011). Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: Which groups are most vulnerable? *Ethnicity & Health, 16*(6), 501–518. https://doi.org/10.1080/13557858.2011.575219.
49. Office of Disease Prevention and Health Promotion. (2018). *Healthypeople 2020: Cancer*. Rockville: Office of Disease Prevention and Health Promotion.